

THE CHESAPEAKE BAY IMPACT CRATER: AN EDUCATIONAL INVESTIGATION FOR STUDENTS INTO THE PLANETARY IMPACT PROCESS AND ITS ENVIRONMENTAL CONSEQUENCES. A. S. Levine, Science Directorate, NASA Langley Research Center, Hampton, VA 23681, arlene.s.levine@nasa.gov

Introduction: Planetary impact craters are a common surface feature of many planetary bodies, including the Earth, the Moon, Mars, Mercury, Venus, and Jupiter's moons, Ganymede and Callisto. The NASA Langley Research Center in Hampton, VA, is located about 5 km inside the outer rim of the Chesapeake Bay Impact Crater. The Chesapeake Bay Impact Crater, with a diameter of 85 km is the sixth largest impact crater on our planet.¹ The U.S. Geological Survey (USGS), in collaboration with the NASA Langley Research Center, the Virginia Department of Environmental Quality (VDEQ), the Hampton Roads Planning District Commission (HRPDC), and the Department of Geology of the College of William and Mary (WM) drilled into and through the crater at the NASA Langley Research Center and obtained a continuous core to a depth of 2075.9 ft (632.73 meters) from the Chesapeake Bay Impact Crater. At the NASA Langley location, the granite basement depth was at 2046 ft (623.87 meters).^{1,2,3}

This collaborative drilling activity provided a unique educational opportunity and ongoing educational partnership between USGS, NASA Langley and the other collaborators. NASA Langley has a decade-long, ongoing educational partnership with the Colonial Coast Council of the Girl Scouts.⁴ The core drilling and on site analysis and cataloguing of the core segments provided a unique opportunity for the Girl Scouts to learn how geologists work in the field, their tools for scientific investigation and evaluation, how they perform geological analyses of the cores in an on-site tent and learn about the formation of impact craters and the impact of impacting bodies on the sub-surface, the surface, the oceans and atmosphere of the target body. This was accomplished with a two-part activity. Girl Scout day camps and local Girl Scout troops were invited to Langley Research Center Conference Center, where more than 300 Girl Scouts, their leaders and adult personnel were given briefings by scientists and educators from the USGS, NASA, VDEQ, HRPDC and WM on the principles of geology, the formation of impact craters, the consequences of the impacting body on the atmosphere, ocean, surface and sub-surface, the geological, chemical and biological analyses of the core and the cataloguing and storage of the core segments, etc. After the briefings, the Girl Scouts visited the drilling site where they inspected the core drilling rig, examined the core samples and discussed the drilling procedures, cores and interpretation of the cores with scientists and educators from the organizations

conducting the core drilling. Demonstrations at the drilling site included demonstrations of impacting objects hitting multi-colored layered mud targets at different angles of entry. The multi-colored layers of mud were instructive in mapping out the distribution of impact-ejected material around the impact crater.

The presentation will include a series of photographs of the Girl Scout participating in activities at the Chesapeake Bay Impact Crater drill site, including retrieving cores from the drilling rig, inspecting the core samples and participating in the impact-crater formation demonstrations.

References: [1] Poag, C. W., C. Koebrel and W. U. Reimold: *The Chesapeake Bay Crater*, Springer-Verlag, Berlin Heidelberg, New York, 2004, 522 pages. [2] Powars, D. S. et al., Preliminary Geologic Summary for the USGS-NASA Langley Corehole, Hampton, VA. U.S. Geological Survey Open File Report 01-87-B:10-19, 2001. [3] Powars, D.S. et al., Structure and Composition of the Southwest Margin of the Buried Chesapeake Bay Impact Structure, Virginia. *Geological Society of America*, 33(6):463, 2001. [4] Levine, A. S.: A NASA/Girl Scout Program to Motivate Girls in Science, Technology, Engineering and Mathematics (STEM). *Journal of Virginia Science Education*, 1 (2), 42-46, 2007.